

PROGRESS REPORT UPDATE ON THE DOE 33/50 POLLUTION PREVENTION PROGRAM

INTRODUCTION

In September 1992, the Secretary of Energy directed the Department of Energy (DOE) to participate in the 33/50 Program, a voluntary pollution prevention initiative in cooperation with the Environmental Protection Agency (EPA), and committed the Department to the following actions:

- By the end of calendar year 1995, strive to achieve a **50 percent** reduction of 17 priority chemicals from the facilities that are currently submitting Toxic Chemical Release Inventory (TRI) Form R reports. The baseline for calculating reductions was the 1988 reporting year, and the 50% reduction goal applied to the aggregate of all 17 priority chemicals and all facilities that reported for calendar years 1988 through 1992.
- Beginning in 1993, with the first reports due July 1, 1994, initiate voluntary TRI Form R reporting by all facilities not already reporting but meeting the reporting thresholds under Section 313 of the Emergency Planning and Community Right-to-Know Act (EPCRA). By the end of calendar year 1997, strive to achieve a **33 percent** reduction in releases of the 17 priority chemicals from these additional facilities using the 1993 reporting year as the baseline for calculating reductions.

This report constitutes a combined two-year

update for calendar years 1991 and 1992 of pollution prevention activities to reduce the release and transfer of TRI chemicals from DOE facilities. It includes information reported by DOE facilities to EPA and entered into the National Library of Medicine's TOXNET database, and information provided by DOE sites on their pollution prevention activities.

DOE's pollution prevention program encourages sites to voluntarily reduce, through source reduction methods, the on-site releases to the environment and off-site transfers of all TRI chemicals. The 33/50 program is a part of the Department's efforts to implement pollution prevention programs at its facilities. Particular emphasis is placed on reducing releases of the 17 priority chemicals. Table 1 presents a listing of all the EPCRA §313 TRI chemicals that were reported by DOE facilities for the calendar years 1991 and 1992. The chemicals reported include 9 of the 17 priority chemicals and 15 additional TRI chemicals.

Table 2 presents a listing of the DOE sites that have reported any TRI chemicals during the period from 1988 through 1992.

Chemicals Reported by DOE in 1991 & 1992

33/50 Program Priority Chemicals

Chromium & Compounds	Toluene
Dichloromethane	1,1,1-Trichloroethane
Trichloroethylene	Xylene (mixed isomers)
Tetrachloroethylene	
Methyl Isobutyl Ketone ('91 only)	
Lead & Compounds ('92 only)	

Additional Chemicals

Acetone	Methanol	
Ammonia		Nitric Acid
Bromotrifluoromethane	PCBs	
Chlorine	Sulfuric Acid	
Dichlorotetrafluoroethane	Trichlorofluoromethane	
Ethylene Glycol	1,2,4-Trimethylbenzene	
Freon 113	Hydrochloric Acid	
Zinc Compounds ('91 only)		

Table 1

DOE Sites Reporting to the TRI 1988-1992

Albuquerque Microelectronics (now closed)
 Brookhaven National Laboratory
 FERMI National Accelerator Laboratory
 Fernald Environmental Management Project
 Hanford Site
 Idaho National Engineering Lab - Specific Mfg.
 Idaho National Engineering Lab - Westinghouse
 Kansas City Plant
 Los Alamos National Laboratory
 Mound Plant
 Oak Ridge K-25 Site
 Oak Ridge National Laboratory
 Oak Ridge Y-12 Plant
 Paducah Gaseous Diffusion Plant
 Pantex Plant
 Pinellas Plant
 Portsmouth Gaseous Diffusion Plant
 Rocky Flats Plant
 Sandia National Labs - New Mexico
 Savannah River Site
 West Valley Demonstration Project

Table 2

STATUS OF 33/50 CHEMICAL REDUCTIONS

Based on the National Library of Medicine's TOXNET database of TRI data, through calendar year 1992, DOE continued to reduce

the overall total of releases and transfers of the 17 priority chemicals (see Figure 1). In both 1991 and 1992, releases continued to decline from previous years, while off-site transfers returned to their pre-1990 levels.

In 1988, 16 DOE facilities submitted TRI reports. Of these, 12 facilities reported the release and/or transfer of 11 of the 17 chemicals targeted in the 33/50 program. In 1991, 20 DOE facilities submitted TRI reports. Of these, 10 facilities reported releases and/or transfers for 8 of the 17 priority chemicals. Additionally, in 1992, 20 DOE facilities submitted Form R reports, of which 8 facilities reported releases and/or transfers for 8 priority chemicals.

Table 3 identifies the priority chemicals reported by each DOE site, and Table 4 presents the total releases and transfers reported for each priority chemical between 1988 and 1992.

Since 1988, DOE has seen an overall reduction

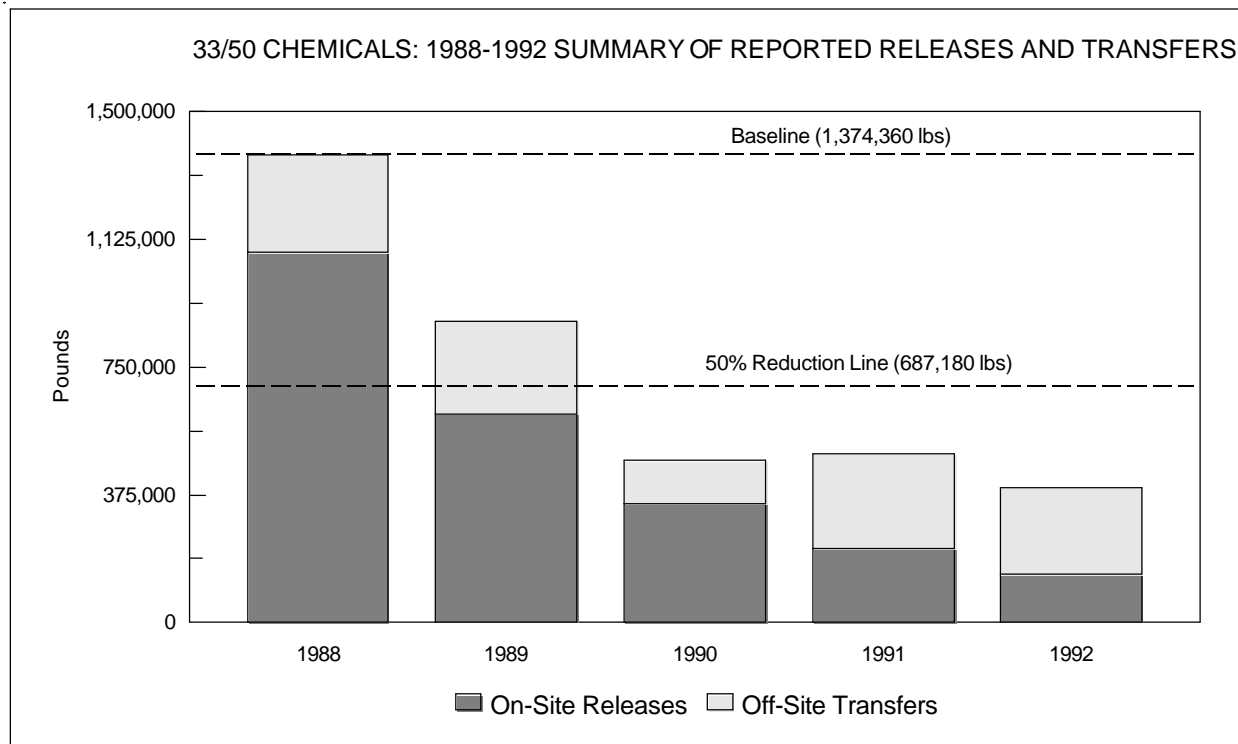


Figure 1

**33/50 CHEMICALS: 1988-1992 SUMMARY OF TOTAL REPORTED RELEASES AND TRANSFERS
BY SITE AND BY CHEMICAL (in pounds)**

SITE/CHEMICAL	1988	1989	1990	1991	1992
<u>BROOKHAVEN NATIONAL LABORATORY</u>					
1,1,1-TRICHLOROETHANE	-	-	-	5,445	2,045
<u>FERNALD ENVIRONMENTAL MANAGEMENT PROJECT</u>					
1,1,1-TRICHLOROETHANE	19,000	-	-	-	-
<u>HANFORD SITE</u>					
LEAD AND COMPOUNDS	-	-	-	-	227,475
METHYL ETHYL KETONE	9,450	-	-	-	-
<u>INEL - SPECIFIC MANUFACTURING</u>					
1,1,1-TRICHLOROETHANE	-	-	16,000	18,034	-
<u>INEL-WESTINGHOUSE</u>					
1,1,1-TRICHLOROETHANE	-	-	-	12	-
METHYL ISOBUTYL KETONE	-	-	-	15,700	-
<u>KANSAS CITY PLANT</u>					
1,1,1-TRICHLOROETHANE	217,074	109,666	80,753	24,847	-
DICHLOROMETHANE	116,407	82,808	51,668	-	-
TOLUENE	18,853	15,343	-	8,381	-
TRICHLOROETHYLENE	187,259	133,569	104,963	46,847	17,900
<u>MOUND PLANT</u>					
DICHLOROMETHANE	11,900	-	-	3,630	790
<u>OAK RIDGE K-25 SITE</u>					
1,1,1-TRICHLOROETHANE	10,789	13,766	-	-	-
CARBON TETRACHLORIDE	500	170	-	-	-
<u>OAK RIDGE NATIONAL LABORATORY</u>					
LEAD AND COMPOUNDS	16,420	897	-	-	-
<u>OAK RIDGE Y-12 PLANT</u>					
1,1,1-TRICHLOROETHANE	188,769	70,731	36,087	-	-
TETRACHLOROETHYLENE	71,257	36,062	21,749	233,017	28,734
<u>PADUCAH GASEOUS DIFFUSION PLANT</u>					
CHROMIUM AND COMPOUNDS	8,700	12,649	14,408	13,324	19,938
TRICHLOROETHYLENE	129,809	90,550	68,392	52,805	23,898
<u>PANTEX PLANT</u>					
CHROMIUM AND COMPOUNDS	-	29,310	-	-	-
METHYL ETHYL KETONE	-	4,501	-	-	-
TOLUENE	-	18,680	-	-	-
TRICHLOROETHYLENE	-	250	-	-	-
XYLENE (MIXED ISOMERS)	-	1,905	-	-	-
<u>PINELLAS PLANT</u>					
1,1,1-TRICHLOROETHANE	13,254	14,503	-	-	13,110
DICHLOROMETHANE	22,174	26,115	-	24,010	22,110
TRICHLOROETHYLENE	34,805	14,216	-	-	-
<u>PORTSMOUTH GASEOUS DIFFUSION PLANT</u>					
1,1,1-TRICHLOROETHANE	64,541	23,000	13,500	21,002	-
CHROMIUM AND COMPOUNDS	24,713	3,060	4,300	1,570	-
<u>ROCKY FLATS PLANT</u>					
1,1,1-TRICHLOROETHANE	47,260	45,850	-	-	-
CARBON TETRACHLORIDE	132,447	48,212	-	-	-
<u>SAVANNAH RIVER SITE</u>					
1,1,1-TRICHLOROETHANE	11,184	22,890	18,572	-	-
BENZENE	-	1,590	6,750	-	-
LEAD AND COMPOUNDS	14,763	18,043	14,014	-	10,048
METHYL ISOBUTYL KETONE	1,250	16,320	-	-	-
TOLUENE	-	11,935	3,557	12,981	8,967
XYLENE (MIXED ISOMERS)	1,782	16,321	23,806	15,274	22,405
TOTAL	1,374,360	882,912	478,519	496,879	397,420

Table 3

33/50 CHEMICALS: 1988-1992 SUMMARY OF TOTAL REPORTED RELEASES AND TRANSFERS BY CHEMICAL (in pounds)							
TARGET CHEMICAL	1988	1989	1990	1991	1992	CHANGE 1988-92	PERCENT CHANGE
BENZENE	-	1,590	6,750	-	-	0	0%
CADMIUM AND COMPOUNDS	-	-	-	-	-	0	0%
CARBON TETRACHLORIDE	132,947	48,382	-	-	-	(132,947)	-100%
CHLOROFORM	-	-	-	-	-	0	0%
CHROMIUM AND COMPOUNDS	33,413	45,019	13,708	14,894	19,938	(13,475)	-40%
CYANIDES	-	-	-	-	-	0	0%
DICHLOROMETHANE	150,481	108,923	51,668	27,640	22,900	(127,581)	-85%
LEAD AND COMPOUNDS	31,183	13,940	14,014	-	237,523	206,340	662%
MERCURY AND COMPOUNDS	-	-	-	-	-	0	0%
METHYL ETHYL KETONE	9,450	4,501	-	-	-	(9,450)	-100%
METHYL ISOBUTYL KETONE	1,250	13,320	-	15,700	-	(1,250)	-100%
NICKEL AND COMPOUNDS	-	-	-	-	-	0	0%
TETRACHLOROETHYLENE	71,257	36,062	21,749	233,017	28,734	(42,523)	-60%
TOLUENE	13,853	45,958	3,557	21,362	8,967	(9,886)	-52%
1,1,1-TRICHLOROETHANE	571,871	300,406	164,912	69,340	15,155	(556,716)	-97%
TRICHLOROETHYLENE	351,873	238,585	173,355	99,652	41,798	(310,075)	-88%
XYLENE(S)	1,782	13,226	23,806	15,274	22,405	20,623	1157%
TOTAL	1,374,360	882,912	478,519	496,879	397,420	(976,940)	-71%

Table 4

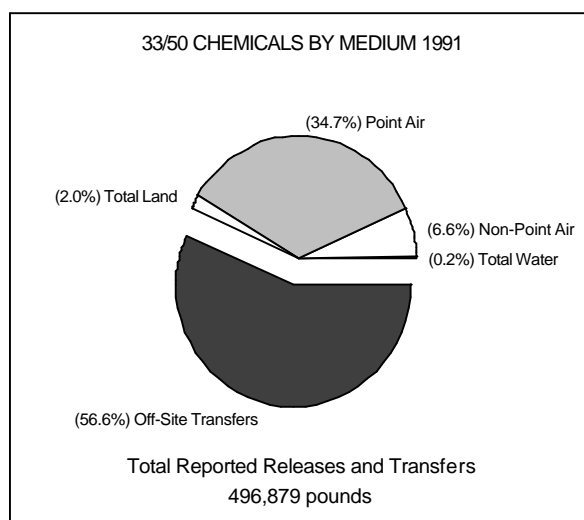


Figure 2

in the total reported releases and transfers of priority chemicals. However, in 1991, there was an increase in total releases and transfers due largely to the off-site transfer of tetrachloroethylene and xylene (mixed isomers) that had accumulated in storage at two sites. The increase in total on-site releases of methyl isobutyl ketone in 1991 was primarily associated with increased Navy fuel reprocessing operations at one site. There was again a

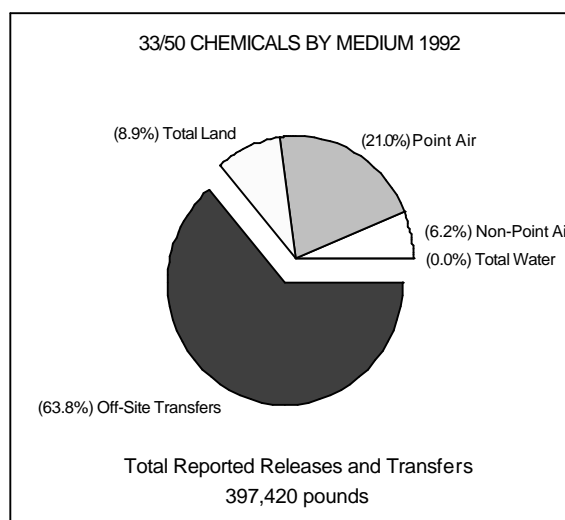


Figure 3

reduction in total releases and transfers between 1991 and 1992. However, the increase in reported quantities of chromium and compounds from 1991 to 1992 was due to production increases at one facility. The significant increase in reported quantities of lead from 1991 to 1992 was primarily due to the off-site transfer of lead at one site.

Figures 2 and 3 present the percentage

distribution between releases and total off-site transfers of 33/50 chemicals, and the percentage distribution of releases by medium (air, water, and land) for calendar years 1991 and 1992. DOE sites reported that total off-site transfers accounted for 57% of the total releases and transfers of the priority chemicals in 1991, while point air releases accounted for approximately 35% of the total releases and transfers. In 1992, while the total pounds of the 17 priority chemicals released and transferred decreased by almost 100 thousand pounds, the percentage of total off-site transfers increased to 64% and total land releases increased to 9%. Decreases were noted in total water and point air release percentages.

Based on EPA's 33/50 Program Fifth Progress Update (EPA 745-R-94-002), the total 1991 U.S. on-site releases and off-site transfers of 33/50 chemicals was 994 million pounds. Compared to the DOE's total releases and off-site transfers of almost 497 thousand pounds, the Department contributed approximately 0.05% to the total U.S. releases and off-site transfers of the priority chemicals in 1991.

For calendar year 1992, EPA reported that total U.S. releases and transfers of 33/50 chemicals totalled 890 million pounds. DOE's 1992 total of about 397 thousand pounds for the 17 priority chemicals represents 0.04% of this total.

OTHER CHEMICALS REPORTED TO TRI BY DOE FACILITIES

In addition to the 17 priority chemicals, DOE began tracking trends in releases and off-site transfers of other TRI chemicals reported by its sites beginning with calendar year 1988. Table 5 identifies the 27 additional TRI chemicals reported by DOE facilities between 1988 and 1992. It is important to note that not all of these 27 chemicals were listed under EPCRA §313 for reporting to the TRI during the entire 1988-1992 period. Chemicals have been both added and deleted from reporting requirements since 1988.

The overall total of reported releases and off-site transfers of the additional chemicals decreased by 88% from 1988 to 1992. This decrease includes chemicals that have been delisted and new chemicals added to the list of reportable chemicals under EPCRA §313. For example, sodium hydroxide (solution) and aluminum oxide (non-fibrous forms) were delisted while trichlorofluoromethane, dichlorotetrafluoroethane (CFC-114) and bromotrifluoromethane were added to the list of chemicals for reporting year 1991.

Significant reductions have been reported for certain listed additional TRI chemicals between 1988 and 1992. These chemicals include: sulfuric acid, freon 113, nitric acid, and chlorine. However, from 1990 to 1991, a substantial increase was noted in the total releases and transfers of the additional chemicals. This increase can be attributed to the release of a newly listed chemical, CFC-114, reported by two facilities. The same two facilities achieved a combined 44% reduction in CFC-114 releases from 1991 to 1992.

POLLUTION PREVENTION AND DOE TRI REPORTING

Reporting year 1991 represented a significant change in TRI reporting. The Pollution Prevention Act of 1990 required that facilities report source reduction and recycling data in a new Section 8 of the Form R. Although this data is not considered in evaluating reductions of releases and off-site transfers of priority chemicals as part of the 33/50 program, it is an important part of the overall pollution prevention program and evaluation for DOE sites.

In addition to the prior requirement of reporting on-site releases to the environment and transfers off-site for treatment and disposal of listed toxic chemicals, the expanded data requirements include reporting the transfers off-site for recycling and energy recovery, as

ADDITIONAL CHEMICALS: 1988-1992 SUMMARY OF TOTAL REPORTED RELEASES AND TRANSFERS BY CHEMICAL (in pounds)							
TARGET CHEMICAL	1988	1989	1990	1991	1992	CHANGE 1988-92	PERCENT CHANGE
SULFURIC ACID	685,776	139,102	165,532	96,462	9,046	(676,730)	-99%
NITRIC ACID	346,114	410,683	147,262	175,625	42,387	(303,727)	-88%
HYDROCHLORIC ACID	36,517	75,576	38,902	5,982	17,630	(18,887)	-52%
CHLORINE	125,300	14,394	22,536	16,027	21,424	(103,876)	-83%
FREON 113	1012,620	841,740	196,055	181,332	33,377	(979,243)	-97%
METHANOL	82,131	62,911	104,270	25,975	64,268	(17,863)	-22%
POLYCHLORINATED BIPHENYLS	105,603	39,786	35,401	21,960	33,700	(71,903)	-68%
ZINC COMPOUNDS	0	0	1,150	1,098	-	0	0%
ETHYLENE GLYCOL	103,171	57,350	9,318	72,669	12,114	(91,057)	-88%
PHOSPHORIC ACID	177	44,371	0	-	-	(177)	-100%
ACETONE	29,230	45,867	31,475	15,760	2,105	(27,125)	-93%
HYDROGEN FLUORIDE	74,836	13,844	3,146	-	-	(74,836)	-100%
AMMONIA	6,800	26,840	9,769	15,483	9,096	2,296	-34%
ACETONITRILE	-	4,098	29,117	-	-	0	0%
MANGANESE COMPOUNDS	190	-	10,128	-	-	(190)	-100%
TRICHLOROFLUOROMETHANE	-	-	-	30,170	14,203	14,203	NA
DICHLOROTETRAFLUOROETHANE	-	-	-	1130,000	626,000	626,000	NA
BROMOTRIFLUOROMETHANE	-	-	-	11,064	3,563	3,563	NA
SODIUM HYDROXIDE (SOLUTION)	494,946	-	-	-	-	(494,946)	-100%
HYDRAZINE	-	55	-	-	-	0	0%
ALUMINUM OXIDE	4,438,647	-	-	-	-	(4,438,647)	-100%
BARIUM	-	1280	-	-	-	0	0%
ETHYLBENZENE	-	250	-	-	-	0	0%
AMMONIUM NITRATE (SOLUTION)	0	-	-	-	-	0	0%
ACRYLAMIDE	-	0	-	-	-	0	0%
12,4-TRIMETHYLBENZENE	-	-	2,090	500	750	750	NA
TOTAL	7,542,058	1,778,147	806,151	1,800,107	889,663	(6,652,395)	-88%

Table 5

well as on-site recycling, energy recovery and treatment.

Figure 4 presents the distribution of reported chemicals by management activity, subsections 8.1 to 8.7 of the Form R report. In 1991, of 7 million pounds reported, approximately 39% of the total was recycled on-site, while 29% was treated on-site and 25% was released. Approximately 6% of the total amount reported on the Form R for Section 8 was treated off-site, while less than 1% was attributed to off-site recycling and energy recovery. In 1992, of 4 million pounds reported, the Form R Section 8 quantities reported for each management

activity decreased or remained approximately the same with one exception, off-site recycling. This 95% increase in off-site recycling from 1991 to 1992 is due to the transfer of lead for off-site recycling at one site.

A total of 23,719 industry facilities, including the DOE sites, reported approximately 37.8 billion pounds of TRI chemicals under Form R, Section 8 for calendar year 1991, and 23,630 facilities reported 37.3 billion pounds for 1992. The 1991 DOE site contribution of 7 million pounds represents approximately 0.02% of the total while the 1992 DOE Section 8 total of almost 4 million pounds represents approximately 0.01%

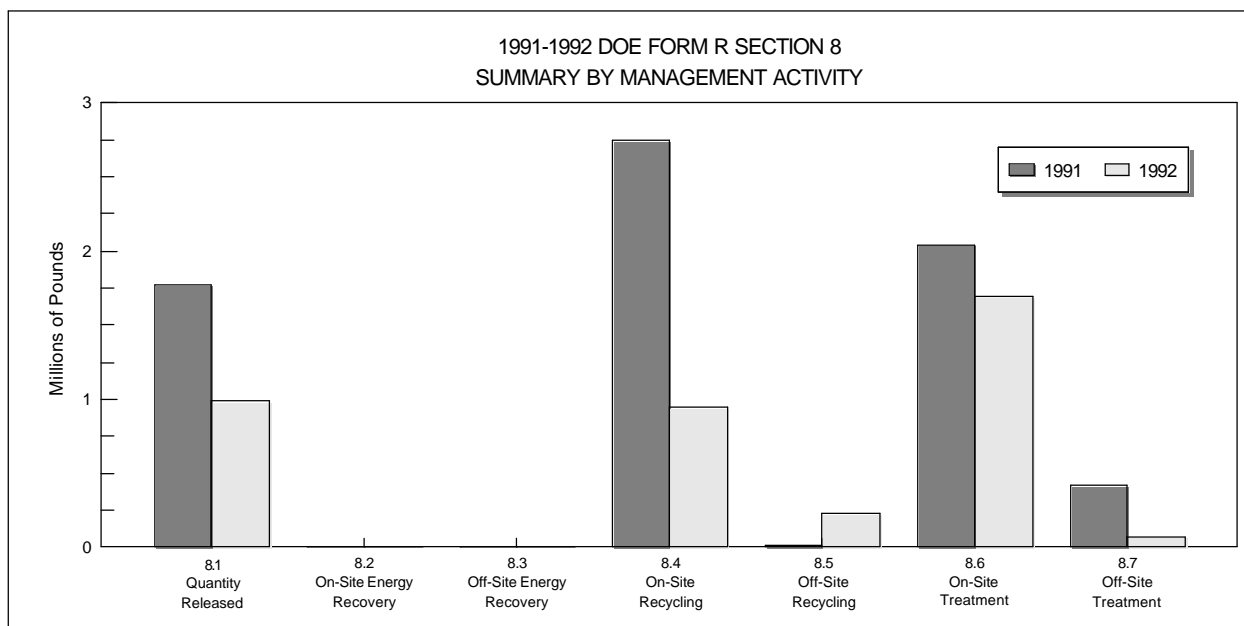


Figure 4

of the 1992 U.S. total.

DEPARTMENT OF ENERGY ACTIVITIES TO REDUCE RELEASES AND TRANSFERS

DOE sites have implemented a variety of pollution prevention initiatives to reduce the release and transfer of 33/50 chemicals. Reductions have been achieved through a range of actions -- from reduced production at facilities and mission changes to specific source reduction activities. Examples of how DOE facilities are achieving source reductions include the following actions.

- The pollution prevention program at the **Kansas City Plant (KCP)** continuously strives to reduce releases to all environmental media. The program primarily focuses on solvent reductions, as solvents accounted for over 90% of the pollution generated by KCP operations in 1988.

Since 1988, the total reportable usage of solvents has decreased by 90%. The 1992

reportable usage decreased 76% from 1991 levels. Reductions in the use of two 33/50 chemicals, 1,1,1-trichloroethane (TCA) and

trichloroethylene (TCE), were achieved by changing processes to replace these solvents with non-hazardous, naturally occurring organic solvents. Aqueous solvents replaced organics in metal part cleaning and degreasing operations. The use of vapor phase cleaning systems continues to decrease. Additional replacement of high volatile organic compound (VOC) paints with low VOC paints decreased the amount of toluene releases.

A major effort was undertaken to re-engineer all the processes used in the manufacture of a complex electrical component assembly. The new, environmentally conscious design eliminated the use of all known or suspect carcinogens and solvents detrimental to the atmospheric ozone layer.

In addition, the KCP began examining all of

its manufacturing and support processes in order to quantify the materials used, characterize the waste streams generated, and identify additional options for preventing pollution. Approximately 490 out of the plant's 1200 processes have been evaluated.

- The **Oak Ridge Reservation** consists of three installations (the Y-12 Plant, Oak Ridge National Laboratory, and the K-25 Site), which operate in a semi-autonomous manner from one another. In June of 1991, an Energy Systems Pollution Prevention Task Team was formed which has developed a draft Pollution Prevention Program Management Plan. Overall, reductions achieved in 1991 and 1992 are largely associated with cutbacks in production and the use of alternatives to toxic chemicals.

The **Oak Ridge Y-12 Plant** (Y-12) has been actively substituting non-chlorinated solvents for chlorinated solvents used for cleaning operations for several years. From 1987-1991, the amount of chlorinated solvents purchased by Y-12 decreased by 92%. In 1991, the use of TCA was reduced from 48 drums per year to 10 drums per year.

Large vapor degreasers used throughout the plant have been replaced with ultrasonic cleaning with aqueous detergent. Halogenated solvents have been replaced with other organic solvents, which are not 33/50 chemicals and were developed and patented at Y-12. These substitute solvents have been implemented throughout the machine shops and inspection areas.

Furthermore, Y-12 has instituted process recirculation to reduce the quantities of methanol used. A series of metal troughs were installed to recover methanol for reintroduction into the process.

At the **Oak Ridge K-25 Site** (K-25), an aqueous cleaner was substituted for TCA, leading to significant decreases in releases. Partly as a result of these activities, K-25 did not meet the reporting threshold for any 33/50 chemicals in 1991 and 1992.

- The **Idaho National Engineering Laboratory** (INEL) reported releases of three TRI chemicals in 1991. Two were 33/50 priority chemicals, TCA and methyl isobutyl ketone, and the third was an additional TRI chemical, nitric acid. In 1992, INEL reported only nitric acid.

Pollution prevention measures undertaken at the INEL, including process modifications and product substitutions, have virtually eliminated releases of the 33/50 chemical TCA, which was previously used to degrease parts prior to painting as well as a component of the paint itself.

Another source reduction activity instituted at INEL involved changing laboratory procedures to reduce usage of acetone and methyl isobutyl ketone. Standard laboratory tests were modified to use smaller quantities of methyl isobutyl ketone than were previously required. Acetone procedures have been replaced with 2-propanol, eliminating a waste stream at the Chemical Processing Plant. INEL has also improved the maintenance scheduling, recordkeeping, and operating procedures associated with methyl isobutyl ketone usage.

- Between 1988 and 1992, the **Pinellas Plant** achieved a 50% reduction in the release and transfer of three 33/50 chemicals, dichloromethane, TCE, and TCA. The plant implemented the following pollution prevention measures: on-time buying which significantly reduced the quantity of chemicals which were being disposed due to expiration of shelf life, a

seven-point resale program which sells excess chemicals rather than disposing of them as a hazardous waste, and the implementation of nickel-teflon plated molds in resin coating which eliminated the need to clean the molds with dichloromethane.

To minimize waste, the Pinellas Pollution Prevention Opportunity Assessment Committee continues to assess manufacturing processes and recommends the use of aqueous degreasers instead of toxic chemical degreasers whenever possible. Reductions in the use of toxic chemical degreasers were also partially due to production schedule decreases.

Finally, annual pollution prevention training for all plant employees is a key pollution prevention activity at the Pinellas Plant.

- Beginning in June 1989, the **Portsmouth Gaseous Diffusion Plant (PORTS)** systematically converted its recirculating cooling water system from a chromate-based program to a phosphate-based program. This conversion has been a resounding success. From 1988 to 1991, PORTS achieved a 94% reduction in reported quantities of chromium compounds, a 33/50 chemical compound category.

In addition, for 1991, PORTS reported that it changed to aqueous cleaners in an effort to reduce quantities of TCA. In 1992, a continuation of the above described activities led to additional reductions of chromium compounds and TCA to below reporting thresholds.

- At the **Savannah River Site (SRS)**, goals have been identified, process waste assessments have been conducted, and methods have been adopted for pollution prevention. Primary source reduction methods include solvent substitution and

waste segregation techniques to reduce waste stream sources and quantities.

In 1991, SRS identified 9 toxic chemicals that exceeded a reporting threshold with reported releases totaling 119 thousand pounds. Two of these 9 chemicals, toluene and xylene, are on the 33/50 priority chemical list. The site reported that maintenance scheduling, recordkeeping, and handling procedures for xylene and toluene were improved in 1991.

One 33/50 chemical that did not exceed the reporting threshold in 1991 was TCA. This solvent was previously used as a welding penetrant and also was found in a variety of products. SRS substituted products that did not contain TCA and reduced the usage of this solvent by 70%.

In 1992, SRS identified 8 toxic chemicals that exceeded reporting thresholds with total reported releases of almost 77 thousand pounds. Three of these 8 chemicals are on the 33/50 priority chemical list (lead, xylene, and toluene). Xylene and toluene releases are associated with combustion emissions from small motors and vapor releases from solvent based paints.

- The pollution prevention program at **Brookhaven National Laboratory (BNL)** is a continuous effort to systematically reduce the volume and toxicity of wastes and environmental releases. The largest successes have resulted from substituting less toxic materials in place of toxic materials in solvent cleaning processes. Subsequently, BNL, which first reported to the TRI in 1991, achieved a 62% reduction in reported releases of TCA, from 1991 to 1992.

Other reuse and recycling methods instituted by BNL that have resulted in reductions in waste generation include:

exchange of unused chemicals; recycle of lead-acid batteries and lead metal; and redistillation of methanol solvents.

- The **Mound Plant** has successfully achieved reductions in toxic chemicals since 1988. Reductions in dichloromethane, the only 33/50 chemical that Mound Plant reported during 1988 to 1992, are due to decreases in production from 1988 through 1990 and the discontinuation of a cleaning process for ceramic parts during 1991 and 1992.

Additionally, reductions in two additional TRI chemicals, sulfuric acid and sodium hydroxide, achieved at the plant since 1988 are also due to decreases in production.

- Methyl ethyl ketone was the only 33/50 priority chemical reported by the **Hanford** site for calendar year 1988. Use of that chemical continued to be below reporting thresholds in 1991 and 1992, continuing the trend since 1989. Significant progress was also made in reducing the use of TRI chemicals that were below reporting thresholds. One example of success was the reduction of the 33/50 chemical carbon tetrachloride, which has long been used in the processing of plutonium scrap at Hanford. Alternatives were identified that will allow the processing of this scrap without that chemical. Current inventories of carbon tetrachloride that were intended for operations will be recycled off-site.

In addition, xylene, toluene and methyl ethyl ketone, 33/50 chemicals which had previously been used as solvents and cleaners in paint-related activities, were replaced with water-based latex paints in many applications. Finally, in 1991, the Hanford site implemented process modifications to reduce the usage of an additional chemical, nitric acid, which contributed to the 80% reduction in reported

releases and transfers of that chemical from 1990 levels at Hanford.

Further, the following facilities reported source reduction activities targeted at reducing reportable quantities of additional TRI chemicals.

- The **Oak Ridge National Laboratory** (ORNL), part of the Oak Ridge Reservation, has been using ethylene glycol in the closed loop chilled water systems since 1966. In 1989, efforts were begun to eliminate the use of this glycol in underground systems. This substitution has significantly reduced the quantities of ethylene glycol used at ORNL. As a result, in 1992, ORNL did not exceed reporting thresholds for ethylene glycol.

- Source reduction activities at the **Paducah Gaseous Diffusion Plant** (PAD) in 1991 and 1992 included increased inspection of potential spill or leak sources followed by improved maintenance and scheduling of repair activities. Leaking condensers and other equipment using CFC-114 were identified with priority being given to those with the greatest potential for leakage. The PAD then evaluated and used new adhesives and elastomers as alternative repair methods in condensers.

These CFC-114 source reduction activities at PAD were identified through internal pollution prevention opportunity audits and participative team management.

- **Los Alamos National Laboratory** (LANL) strives to reduce waste generation on a priority basis. While LANL's priority waste forms are radioactive wastes, LANL does have a comprehensive waste minimization/pollution prevention program addressing all waste types, including solvents.

In both 1991 and 1992, LANL did not

exceed reporting thresholds for any 33/50 chemicals. However, LANL did report one additional chemical, nitric acid, for which it has achieved a reduction since 1988.

- The waste minimization and pollution prevention program at the **Pantex Plant** has been in effect since 1989. The program focuses on both hazardous and non-hazardous wastes. Source reduction has been achieved primarily through chemical substitution. In 1991 and 1992, Pantex did not meet reporting thresholds for any 33/50 chemicals.

Other Pantex pollution prevention efforts include general plant-wide awareness through mandatory training, contests, an employee suggestion program, incorporation of a pollution prevention section in National Environmental Policy Act documents and top management support for this program.

POLLUTION PREVENTION ACTIVITIES SUPPORTING THE 33/50 PROGRAM

The Department continues to expand its pollution prevention activities. Some initiatives include the following actions.

- Building upon the earlier Secretarial pollution prevention policy statement, DOE's Strategic Plan identified "Environmental Quality" as one of the Department's five businesses. The Strategic Plan directed DOE sites to "implement aggressive waste minimization and pollution prevention activities" to achieve environmental quality.
- The Department issued an updated Waste Minimization/Pollution Prevention Crosscut Plan in 1994 which outlined a comprehensive program for integrating pollution prevention into all DOE activities. This includes setting DOE policy and goals for reducing the release of toxic chemicals,

establishing an infrastructure to achieve and measure the goals, and increasing recycling activities throughout the DOE complex.

- To further promote pollution prevention, DOE established the Pollution Prevention Executive Board, which is chaired by the Deputy Secretary of DOE and is comprised of representatives from each of DOE's major offices. A specific objective of the board is to increase the priority of pollution prevention and make it a regular part of the budget process.
- During the spring of 1994, DOE conducted three additional two and one-half-day training workshops on the Department's participation in the 33/50 program and TRI reporting. This training supplemented the three workshops conducted in 1993, and increased the total number of DOE and operating contractor personnel that have been trained to approximately 200.
- The Department has established a prototype computer based Pollution Prevention Information Clearinghouse (EPIC) to network available pollution prevention information resources.
- Site Pollution Prevention Awareness Plans, as required under DOE Order 5400.1, are now in effect throughout DOE. These plans identify site pollution prevention initiatives and include elements for employee awareness through training, awareness campaigns and incentives/ awards programs.
- The Department completed a videotape titled, "Pollution Prevention: Its Everyone's Job," to encourage the implementation of pollution prevention activities at DOE sites. In addition, DOE prepared a second videotape titled, "Meeting the Mandate: Management's Role in Complying with Executive Order 12856," regarding federal

facility compliance with right-to-know laws and pollution prevention requirements. This videotape is intended for a management-level audience and addresses the specific requirements of the Order.

measuring the Department's pollution prevention progress while performing its national missions.

- DOE continues to fund its national laboratories for pollution prevention innovation, including the development, demonstration, testing, evaluation and implementation of new environmentally benign technologies, or "Environmentally Conscious Manufacturing" (ECM). ECM activities include product reformulation, substitution of materials, process modification, equipment design, and recycling.

FUTURE CHALLENGES IN POLLUTION PREVENTION AND THE 33/50 PROGRAM

The Department's long-range pollution prevention goal is to continually seek to reduce the hazards to public health and the environment associated with releases of hazardous substances, pollutants and contaminants. The DOE 33/50 program has been a positive step in demonstrating our commitment to reduce releases of toxic chemicals through avoidance or reduction in the generation of these chemicals at their source. The Department will continue to track the progress of its sites in achieving, by the end of calendar year 1997, a 33% reduction goal for those facilities that began TRI reporting in 1993. Executive Order 12856, titled "Federal Compliance With Right-to-Know Laws and Pollution Prevention Requirements", establishes a new goal for the Department of reducing total releases and off-site transfers of all TRI chemicals from DOE facilities by 50% by the end of 1999.

As DOE's pollution prevention efforts expand to respond to the requirements of E.O. 12856, the combined goals of the Order and the on-going DOE 33/50 program will establish a basis for